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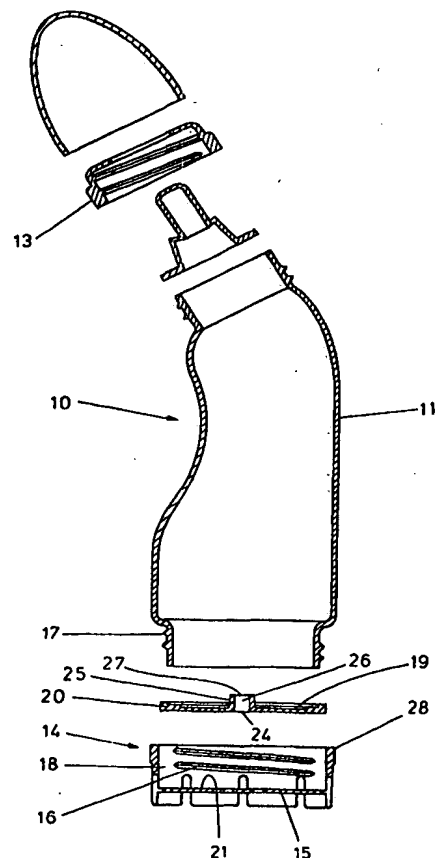


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/GB97/02785 <b>(22) International Filing Date:</b> 23 October 1997 (23.10.97)  <b>(30) Priority Data:</b> 9622255.9      25 October 1996 (25.10.96)      GB  <b>(71)(72) Applicants and Inventors:</b> SIDI, Alan [GB/GB]; 4 Appleton Grove, East End Park, Leeds, West Yorkshire LS9 9EN (GB). DENBY-SIDI, Jeannie, Elizabeth [GB/GB]; 129 Carr Manor Road, Leeds, West Yorkshire LS17 5AB (GB).  <b>(74) Agent:</b> JOHNSTONE, Helen, Margaret; Urquhart-Dykes & Lord, Tower House, Merrion Way, Leeds, West Yorkshire LS2 8PA (GB).		<b>(81) Designated States:</b> AU, BR, KR, MX, NZ, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i>

**(54) Title:** FEEDING BOTTLE AND VALVE MEMBER FOR USE THEREIN**(57) Abstract**

A feeding bottle (10) comprises a valve (14) comprising a resiliently deformable sheet (19) formed with an aperture (22). The aperture is surrounded by central disc member (23) which serves to minimise the ingress of dirt into the bottle (10) and also maintains the rigidity of the valve member flush with bay retaining member (15).



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## FEEDING BOTTLE AND VALVE MEMBER FOR USE THEREIN

The present invention to a feeding bottle and to a valve member for use therein.

In known feeding bottles, a baby sucks milk or some other liquid through a teat. As the baby sucks, the pressure inside the bottle is reduced to a level below atmospheric pressure and it becomes difficult for the baby to continue to suck liquid out of the bottle. It therefore becomes necessary to periodically interrupt the baby's feeding to allow the pressure inside the bottle to return to atmospheric pressure to enable feeding to continue.

A feeding bottle is disclosed in UK patent no. 2238729 in which the end of the bottle remote from the teat is provided with an air inlet valve. The air inlet valve comprises a resiliently deformable valve sheet member having a slit formed therein such that when the valve is in a closed position, the sheet member is generally flat causing the slit to be forced closed, while when the valve is in an open position, the sheet member curves inwards to cause the slit to open.

This bottle suffers from the drawback that when the pressure inside the bottle is greater than atmospheric pressure, for example when the bottle containing milk is placed in hot water in order to heat the milk, the pressure inside the bottle sometimes causes inside of the bottle to be exuded outwards through the air inlet valve.

Preferred embodiments of the present invention seek to overcome this disadvantage of the prior art.

According to an aspect of the present invention, there is provided a valve member for a feeding bottle, the valve member comprising:

- a resiliently deformable sheet having at least one aperture extending therethrough from a first side to a second side thereof; and

- a respective protrusion surrounding the or each said aperture and arranged on the first side of said sheet, wherein the or each said protrusion is provided with a slit

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such that a pressure difference acting from said first to said second side causes the or each said slit to tend to close, and a pressure difference acting from said second to said first side causes the or each slit to tend to open to allow one way air flow through the or each aperture in use.

By providing one or more protrusions arranged on one side of the valve member, this has the advantage of enabling the effect of pressure drops inside the bottle in use to be minimised, while also minimising the exit of liquid out of the bottle.

Preferably, said sheet and/or the or each said protrusion are formed substantially of rubber.

Preferably, the or each said protrusion has a hollow interior and said corresponding slit is arranged at an end of the protrusion remote from said sheet.

Preferably, the or each said protrusion has side walls converging in a direction towards said corresponding slit.

This has the advantage of enabling the valve member to be constructed such that pressure acting so as to close the or each slit compresses the interior of the or each protrusion to enhance the slit closing effect.

The valve member may comprise a single said aperture arranged substantially centrally of said sheet.

By providing a single aperture arranged generally centrally of the valve member, this has the advantage of enabling the flexibility of the sheet to be used to maximum effect.

According to another aspect of the present invention, there is provided a bottle comprising:

a hollow body having a first end adapted to receive a teat and a second end remote from said first end; and

an air inlet valve arranged in use at said second end, wherein the air inlet valve comprises a rigid retaining member for accommodating a valve member as defined above such that the or each protrusion faces the interior of the body, and has a respective aperture therethrough cooperating with the or each said aperture of the valve member in use.

cooperating in use with a screw thread on the second end of the body.

In a preferred embodiment, the retaining member comprises a plate member partially covering the or each aperture therethrough.

By partially covering the or each aperture, the ingress of larger pieces of foreign matter such as dirt is minimised.

The bottle may further comprise protection means for protecting the retaining member and/or valve member from the environment.

Preferably the protection means comprises a substantially cylindrical member adapted to slidably fit over the retaining member.

Since feeding bottles are often constructed in such a way as to be able to be stood upright on their ends remote from the teat to enable the bottle to be put down with one hand while preventing liquid spillage, this has the advantage of enabling the bottle to be constructed in this way also while minimising ingress of environmental substances such as damp.

The retaining member preferably has a protruding portion adapted to abut against the protection means.

In a preferred embodiment, the axis of the first end extends at an angle to the axis of the second end.

This has the advantage of enabling the bottle to have a particularly ergonomic construction.

As an aid to understanding the invention, a preferred embodiment thereof will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings, in which:-

Figure 1 is a cross sectional elevation view of a feeding bottle embodying the present invention;

Figure 2a is a plan view of a retaining member of an air inlet valve of the bottle of Figure 1;

Figure 2b is a cross sectional elevation view of the retaining member of Figure 2a;

Figure 3a is a view from below of a valve member of the air inlet valve of the bottle of Figure 1;

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Figure 3b is a cross sectional elevation view of the valve member of Figure 3a; and

Figure 4 is a schematic representation of a protection means for use with the bottle of Figure 1.

Referring in detail to Figure 1, a feeding bottle 10 has a body 11 formed from glass, plastics or the like and adapted to receive a teat 12 at one end thereof. The body 11 is so shaped that the longitudinal axis thereof at the upper end as shown in Figure 1 extends at an angle to the longitudinal axis at the lower end. This serves to enable a person feeding a baby to present the teat 12 to the baby's mouth while at the same time keeping the hand holding the bottle 10 close to the body, thus minimising discomfort. The teat is fitted to the bottle in a conventional manner by clamping the teat between the body 11 and a threaded cap 13 which cooperates with a thread on the body 11. An air inlet valve 14 is provided at the other end of the body 11 remote from the teat 12.

The air inlet valve 14 is shown in greater detail in Figures 2 and 3 and comprises a rigid retaining member 15 in the form of a cap of plastics material and having a screw thread 16 for cooperating with a corresponding thread on 17 the end of the body 11.

The retaining member 15 forms a recess 18 for receiving a resiliently deformable valve member 19 of suitable material such as rubber such that a generally circular disc 20 of the valve member 19 can be arranged with one side thereof flush with an end surface 21 of the retaining member 15.

The retaining member 15 and valve member 19 each have an aperture arranged generally centrally therein. The aperture 22 in the retaining member 15 is generally circular with diameter of approximately 4mm and contains a central disc member 23 so that the aperture is formed by two arcuate portions. The disc member 23 serves to minimise ingress of dirt into the bottle 10 and also maintains rigidity of the valve member 19 when it is flush with the retaining member 15.

The aperture 24 in the valve member 19 is formed in the disc 20 thereof and a centrally arranged protrusion 25 extends

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from the aperture 24 on the side of the valve member 19 facing away from the retaining member 15 (i.e. the side thereof facing towards the interior of the body 11). The aperture 24 in the valve member 19 is generally rectangular and the protrusion 25 has walls forming a hollow interior 26 of generally rectangular cross section, the cross section decreasing in a direction away from the disc 20. The protrusion 25 also has an end wall having a slit 27 therein such that a pressure difference acting towards the outside of the body 11 from inside presses the disc 20 flat against the surface 21 of the retaining member 15 and also compresses the side walls of the protrusion 25 to close the slit 27. On the other hand, a pressure difference acting from the outside towards the inside of the body 11 draws air through the aperture 22 in the retaining member 15 to cause the disc 20 to flex towards the interior of the body 11 while also tending to open the slit 27 in the end wall so that air can pass through the aperture 24 in the valve member 19 to enter the bottle 10.

The retaining member 15 also has a portion 28 of increased diameter to allow a hollow cylindrical protective sleeve 29 as shown in Figure 4 to be slid onto the retaining member 15. This enables the bottle 10 to be stood upright on the protective sleeve 29 while preventing any dirt or undesired media such as liquids from the environment from entering the aperture 22 in the retaining member 15.

The operation of the bottle 10 will now be described.

When the bottle 10 contains liquid such as milk, it is first heated, usually by being placed in a microwave oven or into hot water. The tendency of any increase in pressure inside the bottle 10 caused by such heating to force liquid outwards through the aperture 24 in the valve member 19 is counteracted by that pressure compressing the walls of the protrusion 25 and forcing the disc 20 of the valve member 19 against the end wall 21 of the retaining member 15, thus forcing the slit 27 closed.

When the baby begins to feed by sucking on the teat 12, the pressure within the bottle 10 is reduced, which in turn



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draw air through the aperture 22 in the retaining member 15 and causes the disc 20 of the valve member 19 to flex at its central region towards the interior of the body 11 away from the end wall 21 of the retaining member 15. This in turn causes the slit 27 to open and air to enter the bottle 10 through the slit 27 to equalise the pressures inside and outside of the bottle and enable the baby to continue feeding.

It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

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## CLAIMS

1. A valve member for a feeding bottle, the valve member comprising:

a resiliently deformable sheet having at least one aperture extending therethrough from a first side to a second side thereof; and

a respective protrusion surrounding the or each said aperture and arranged on the first side of said sheet, wherein the or each said protrusion is provided with a slit such that a pressure difference acting from said first to said second side causes the or each said slit to tend to close, and a pressure difference acting from said second to said first side causes the or each slit to tend to open to allow one way air flow through the or each aperture in use.

2. A valve member according to claim 1, wherein said sheet and/or the or each said protrusion are formed substantially of rubber.

3. A valve member according to claim 1 or 2, wherein the or each said protrusion has a hollow interior and said corresponding slit is arranged at an end of the protrusion remote from said sheet.

4. A valve member according to claim 3, wherein the or each said protrusion has side walls converging in a direction towards said corresponding slit.

5. A valve member according to any one of the preceding claims, comprising a single said aperture arranged substantially centrally of said sheet.

6. A valve member for a feeding bottle, the valve member substantially as hereinbefore described with reference to the accompanying drawings.

7. A feeding bottle comprising:

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a hollow body having a first end adapted to receive a teat and a second end remote from said first end; and

an air inlet valve arranged in use at said second end, wherein the air inlet valve comprises a rigid retaining member for accommodating a valve member according to any one of the preceding claims such that the or each protrusion faces the interior of the body, and has a respective aperture therethrough cooperating with the or each said aperture of the valve member in use.

8. A feeding bottle according to claims 5 and 7, wherein the retaining member has a single aperture therethrough and arranged substantially centrally thereof.

9. A feeding bottle according to claim 7 or 8, wherein the retaining member comprises a screw thread cooperating in use with a screw thread on the second end of the body.

10. A feeding bottle according to any one of claims 7 to 9, wherein the retaining member comprises a plate member partially covering the or each aperture therethrough.

11. A feeding bottle according to any one of claims 7 to 10, further comprising protection means for protecting the retaining member and/or valve member from the environment.

12. A feeding bottle according to claim 11, wherein the protection means comprises a substantially cylindrical member adapted to slidably fit over the retaining member.

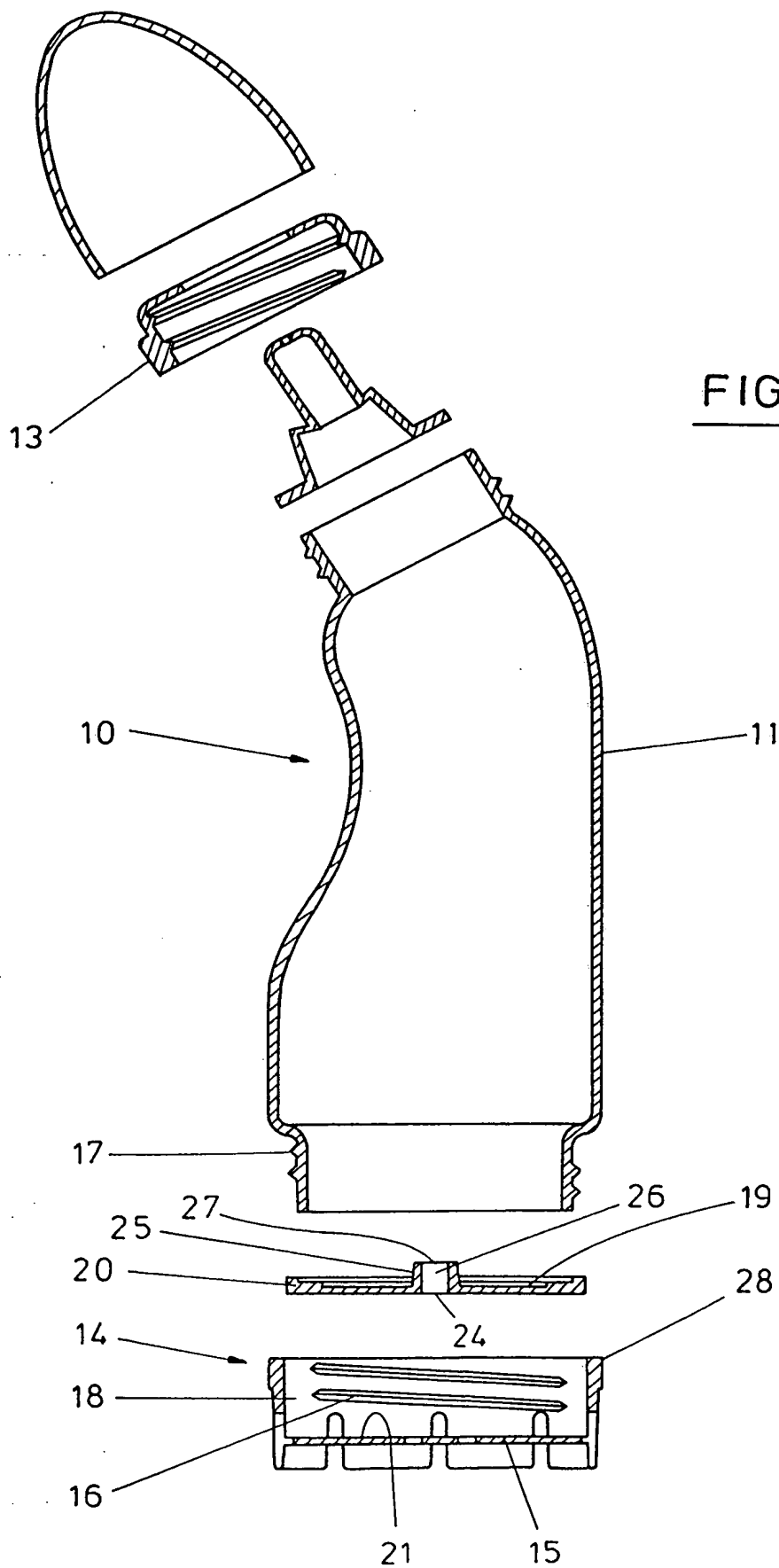
13. A feeding bottle according to claim 11 or 12, wherein the retaining member has a protruding portion adapted to abut against the protection means.

14. A feeding bottle according to any one of claims 7 to 13, wherein the axis of the first end extends at an angle to the axis of the second end.

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15. A feeding bottle, the bottle substantially as hereinbefore described with reference to the accompanying drawings.

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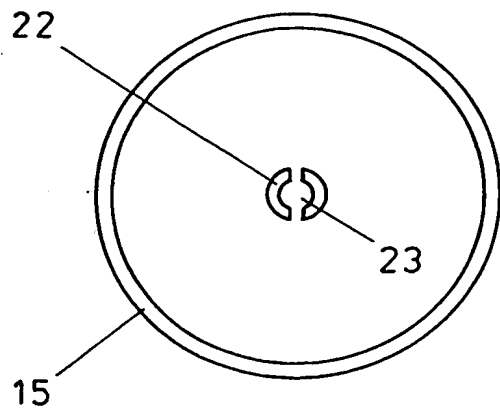


FIG. 2a

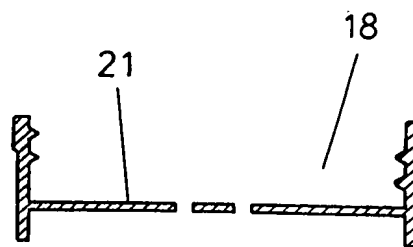


FIG. 2b

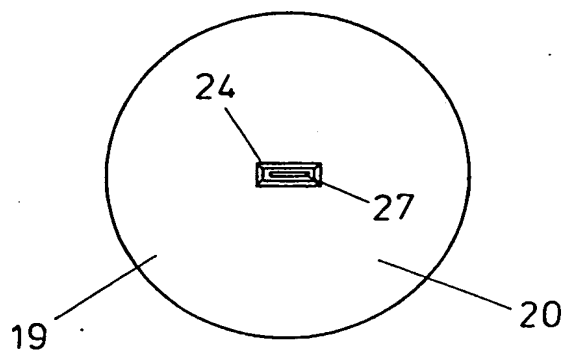


FIG. 3a

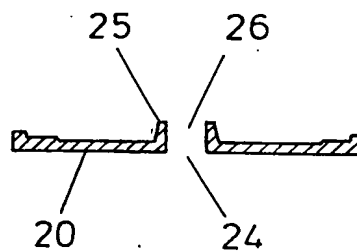


FIG. 3b

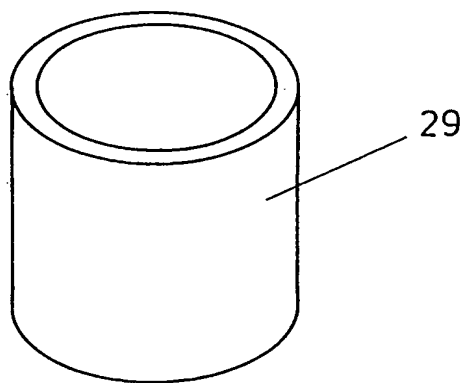


FIG. 4

## INTERNATIONAL SEARCH REPORT

Int. l. Application No

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## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A61J9/04

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X	US 2 394 722 A (SLOANE) 12 February 1946 see page 1, column 2, line 19 - line 29; figures 3,5	1-6
X	US 4 685 577 A (CHEN WEN CHUNG) 11 August 1987 see abstract; figures	1-4,6
X Y	DE 87 04 733 U (SCHMIDT) 3 September 1987 see the whole document	1-9,15 11-14
Y	WO 92 21312 A (SIDI ALAN ;DENBY SIDI JEANNIE ELIZABETH (GB)) 10 December 1992 cited in the application see page 3, line 19 - line 28; figures 1,4	11-13
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